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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/471,467	12/22/99	THOMSON	D 003263.P003

EXAMINER	
ART UNIT	PAPER NUMBER
2856	4

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DATE MAILED: 02/02/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/471,467	Applicant(s) THOMSON et al.
	Examiner Daniel Larkin	Group Art Unit 2856

☐ Responsive to communication(s) filed on _____ .

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *THREE (3)* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-23* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-23* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☒ The drawing(s) filed on *22 Dec 1999* is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

1. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

2. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

Reference numerals -- 305A --, -- 307A --, -- 309A --, -- 305B --, -- 307B --, and -- 309B -- as shown in Figure 5 do not appear within the written specification. Correction is required.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "placement of reflective surface/diffraction grating on the front side of the cantilever", as recited in claims 5, 7, 21, and 23 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

5. Applicants are required to submit a proposed drawing correction in response to this Office Action. Any proposal by the Applicants for amendment of the drawings to cure defects must consist of two parts:

a) A *separate* letter to the Draftsman in accordance with MPEP § 608.02(r); and

b) A print or pen-and-ink sketch showing changes in *red ink* in accordance with MPEP § 608.02(v).

IMPORTANT NOTE: The filing of new formal drawings to correct the noted defect may be deferred until the application is allowed by the Examiner, but the print or pen-and-ink sketch with proposed corrections shown in red ink is required in response to this Office Action, and *may not be deferred.*

6. The disclosure is objected to because of the following informalities:

Page 3, line 4: The verb -- is -- should be inserted prior to the term "positioned"; the conjunction -- and -- should be inserted prior to the term "protruding"; and the term "protruding" should be corrected to read -- protrudes --.

Page 9, line 15: Reference numeral "319" should be corrected to read -- 309 --. Correction is required.

7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

The specification fails to disclose the material components, i.e. silicon or silicon nitride, comprising the cantilever as recited in claims 8 and 9.

8. Claims 1-23 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification fails to adequately disclose how light from a light source is reflected off a cantilever mounted reflective structure in a direction back towards the light source. The prior art almost entirely shows light being reflected where the angle of reflection equals the angle of incidence; however, Applicants disclose that light is reflected, in one embodiment, back along the angle of incidence without disclosing the specifics of the reflective surface. The Examiner upon reading the specification is unsure whether or not the reflective structure is somehow raised to create this reflected light or the reflected light is a small component of the total light reflected from the cantilever that is being ignored by the prior art. The specification discloses that a diffraction grating may be used as a reflective structure; however, the specification does not appear to suggest that the reflective structure is strictly a diffraction grating only. Figure 6 shows a raised reflection surface (603); however, the specification fails to disclose that the reflective surface is in fact raised. The specification only recites that the light source is not mounted in a direction perpendicular to the cantilever, page 13, lines 19-22 through page 14, lines 1-4.

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 5,394,741 (Kajimura et al.).

The reference to Kajimura et al. discloses an atomic force microscope comprising a cantilever (16) with tip (14), the cantilever having a first end and a second end; a reflective structure (48) mounted on the back side of the cantilever (16); a light source (32) mounted near the fixed end of the cantilever (16); and a photodetector (34) also mounted near the fixed end of the cantilever (16), as shown in Figure 10. The deflection of the cantilever (16) is detected by passing light from a laser source (24) through a waveguide (46) comprising the cantilever (16) towards a conventional grating reflection element (48) mounted on the free end of the cantilever (16). The light from the waveguide (46) is vertically reflected by the grating (48) onto a mirror (50) mounted parallel to the grating (48). The mirror (50) reflects the light back through the grating (48) and the waveguide (46) to a reflection cleavage plane (32). The photodetector (34) detects the displacement of the probe as a variation in intensity of light from the reflection cleavage plane (32) (col. 8, lines 52-68 through col. 9, lines 1-9). The reference states that the cantilever may be comprised on silicon dioxide or silicon nitride (col. 4, lines 64 and 65). The reference further states that the cantilever (16) is attached to a silicon substrate (118).

As to the limitation of providing a reflective structure/diffraction grating on the front side of the cantilever, as recited in claims 5, 7, 21, and 23, the Examiner argues that this feature is a choice of design which would be obvious to one of ordinary skill in the art. Manipulating the position of the equipment, such as reflective surfaces, lasers, detectors, etc. is well established in the force microscopy art as a means to enhance measurement results.

As to the limitation of placing the cantilever onto a chip having tapered sides, as recited in claim 11, the Examiner argues that the shape of the substrate is an obvious choice of design which would be well known to those in the cantilever fabrication art.

As to the limitation of using the microscope to capacitively couple the cantilever/tip to a signal line proximate the sample surface, as recited in claims 13, 14, and 17-19, the Examiner argues that capacitively coupling a cantilever to a sample surface is well known in the force microscope art, and merely using the microscope with a signal line proximate a sample surface would be obvious to those of ordinary skill in the art of force microscopy.

12. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

The article to Albrecht et al. discloses a number of microfabrication processes of constructing cantilever styli with properties ideal for atomic force microscopy.

The article to Manalis et al. discloses a sensor for an atomic force microscope where a silicon cantilever is micromachined into the shape of interdigitated fingers that form a diffraction grating.

The article to Yaralioglu et al. discloses an interdigitated cantilever used as a sensor for atomic force microscopy.

The reference to US 5,908,981 (Atalar et al.) discloses an interdigital deflection sensor for microcantilevers.

13. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Daniel Larkin whose telephone number is (703) 308-6724. The Examiner can normally be reached on Monday-Friday from 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Hezron E. Williams, can be reached on (703) 305-4705. The FAX telephone number for this Technology Center (TC 2800, unit 2856) is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Daniel Larkin

29 January 2001

DANIEL S. LARKIN
PRIMARY EXAMINER